New draft

Draft Energy Policy of the Slovak Republic

Contents

Introduction

The Energy Policy is a strategic document setting out principal goals and frameworks of power industry development in long term perspective. The Energy Policy is a part of national economic strategy of the Slovak Republic, since ensuring maximum economic growth while retaining sustainable development is conditioned by reliability of energy supplies at optimum cost and adequate environmental protection.

The previous version of the Energy Policy has been noted by the Government of the Slovak Republic on 12 January 2000 under the Resolution of the Government of the Slovak Republic No 5/2000. Economic development, trends in power industry liberalisation in Europe, accession of Slovakia into the European Union and adoption of new EU Directives regulating the field of power industry called for development of a new Energy Policy.

The Energy Policy constitutes the starting point for further development direction of:

- electricity industry
- heat industry,
- gas industry
- production and transport of oil,
- coal production,
- use of renewable energy sources.

The goal of the Energy Policy is to create prerequisites for ensuring sufficient volume of energy, its efficient utilisation, safe and continuous supply as well as maximisation of savings on the consumption side.

Implementation of the Energy Policy will cater for securing energy requirements of the Slovak Republic, a path to continuous decrease of energy intensiveness, creation of competitive environment on the energy market aiming at lowering cost on all levels and removing unilateral dependency on the energy supplier. At the same time, the implementation of the Policy forms prerequisites for increasing energy utilisation efficiency.

The Energy Policy has been developed pursuant to Act No 656/2004 Col. On Power Industry and Amendment of Respective Acts, for the period of 25 years. The Ministry of Economy of the Slovak Republic shall update the Energy Policy at least every five years reviewing changes in factors with direct or indirect impact on the Energy Policy.

1. POWER INDUSTRY IN THE EU COUNTRIES AND IN THE SLOVAK REPUBLIC

1.1. Energy policy of EU countries

The basic objective of energy policies of EU member states is to:

- ensure sufficient volume of energy sources while maximising energy savings on the consumption side,
- ensure safe and continuous energy supplies while retaining a balanced structure of its individual components in the manner enabling, in case of an energy source outage, its replacement with another source.

Over the recent years, in all EU member states, the question of energy source diversification has become a crucial one; not only by individual energy source types but also by regions of their geographical origin.

Currently, EU member states cover almost half of their energy consumption with imports from third countries territory. Owing to the expected energy consumption growth in the future and given the possibilities of utilisation of national energy sources to saturate increasing consumption, we can anticipate increase of dependency on import.

The most utilised national energy source in EU member states is coal. Clean coal technologies enable to utilise relatively large coal supplies with minimum environmental impact. Lignite (brown coal) is predominantly a result of domestic production; black coal is catered for also by means of import from territories outside EU member states.

The risk that EU member states face is significant dependence on import of oil and its derivatives from third countries, given their insufficient availability on the EU market as well as due to price instability. Although electricity and heat production based on oil products has been gradually declining, the overall demand for such products still remains high; mostly due to increasing consumption in transportation.

At present, natural gas production has seen the biggest growth because of acceptance of its impact on the environment. Its limited availability on the common market as well as dependency of its price on oil prices remains a problem, however. Over the recent period, the need for supplies of the common market with natural gas from Algeria, Norway and Russia has increased.

Approximately one third of electricity consumed in EU countries is produced in nuclear power stations. Owing to increasing electricity consumption and the need to decrease greenhouse effect emissions, the negative attitude of some EU member states towards nuclear power engineering has recently started to change. To further increase its utilisation, the question of operational safety needs to be resolved together with the question of atomic waste disposal.

In order to strengthen their energy independence, EM member countries have gradually laid more emphasis on use of renewable energy sources. Reaching 12% share of renewable energy sources in the total energy consumption by 2010 is an ambitious target set by the EU. Several institutional and financial instruments and schemes have been created to facilitate renewable energy source utilisation. Use of wind energy and biomass have seen the highest boom. Renewable energy sources will be an important component of energy source

structure but their potential to replace the other energy sources will remain, in the following couple of years, limited.

1.2. Energy Policy in the Slovak Republic

1.2.1. Evaluation of Fulfilment of Measures in Energy Policy 2000

Energy plays a key role in the economy of the Slovak Republic. The latest Energy Policy was submitted to the Government in January 2000, which adopted Resolution No 5/2000, concurrently assigning specific tasks to several central institutions aimed at conceptual resolving the topic, namely:

- power industry development tendency in relation to the EU accession process (electricity and gas market liberalisation and power industry restructuring),
- domestic coal production and questions related to gradual slowdown of ineffective coal production,
- diversification of energy sources,
- ensuring continuous energy supplies including potential state of emergency,
- rationalisation of fuel and energy consumption,
- completion of construction of new capacities at the Mohave nuclear power plant,
- atomic waste disposal,
- disposal of atomic power plan equipment.

Evaluation of fulfilment of individual measures arising from the Energy Policy is included in Annex No 1.

1.2.2. Energy Market Liberalisation, Restructuring and Privatisation

Implementation of the Energy Policy over the past three years in line with the direction of the EU energy policy has signified gradual energy market liberalisation.

The power industry has witnessed wide restructuring also after the year 2000 resulting in increase of the industry's economic efficiency. The restructuring has been accompanied with transformation and privatisation. As of now, we can say that the process of privatisation in the power industry is just before its conclusion, bringing in change in ownership relationships implemented by entry of strategic investors into transformed energy companies. Renowned foreign investors have entered the power distribution companies and the entry of a foreign investor into the electricity production plant is just before its completion. Total privatisation of the remaining shares in the gas transport operator or distributor, or oil transport operator or electricity transmission plant is not considered.

The objective of the market liberalisation was to create competitive environment even with the existence of natural monopolies enabling, on one hand, electricity and gas consumers, to chose a supplier while, on the other, offering the existence of balanced competition among individual suppliers, gradually creating natural pressure on increasing economic effectiveness.

The energy market witnesses open competition as far as production and offer as concerned as well as supply and trade of electricity and gas, based on transparent rules without the possibility to discriminate or, on the contrary, to favour any of the suppliers.

Introducing new market rules created space for utilisation of benefits, which may arise in the internal electricity and gas market with regards to improved efficiency of plants and networks operations, increases service level provided, pressure on price reduction and higher competition. There is still room to implement measures focused on ensuring equal conditions for all market players, on reduction of risks regarding the dominant position of individual market players and predatory behaviour as well as enforcing non-discriminatory tariffs applicable to electricity transmission and distribution together with gas transport and distribution based on publicising tariffs prior to their effective date as well as ensuring consumer right protection.

1.2.2.1. Energy Market Regulation

Energy market liberalisation requires systemic changes of the entire business environment, covering not only power engineering business entities. Since the energy network operations nature does not enable introduction of full competition, regulation plays a crucial role in this area, ensuring:

- non-discriminatory and transparent execution of activities in distribution network industry branches,
- applying regulatory measures aimed at reduction of risks arising from breach of fair competition rules by misuse of dominant position on the energy and services market,
- consumer rights protection,
- applying measures to ensure reliable, effective and high-quality energy supply and provision of related services.

In order to build functional electricity market and to create competitive environment in power industry, conditions enabling price/tariff rebalancing will be created to introduce differentiation by consume type (volume of energy consumption) within the context of general EU practise and principles used to ensure that prices and tariffs reflect cost. For the period after 2007, price/tariff rebalancing in electricity industry appears to be appropriate to be implemented based on clear and transparent rules.

Directive No 2003/54/EC concerning common rules for the internal market in electricity and Directive No 2003/55/EC concerning common rules for the internal market in gas adopted by the European Parliament and the Council have become the basis for unification of rules necessary for functioning internal market with electricity and gas as well as for creating a functional internal market in all EU member states including the Slovak Republic. Besides the restructuring itself, implementation of key directives regulating the EC electricity and gas internal market will require, on the side of service providers, implementation of rules enabling competitive environment on the power industry in a transparent and non-discriminating manner.

It is necessary to monitor the impact of energy legislation on market liberalisation, to analyse barriers to true opening of the electricity and gas market and to adopt respective legislation to remove such barriers.

2. ENERGY POLICY LONG-TERM CONCEPT

The Energy Policy long-term concept is based on permanent reduction of energy intensiveness of the economy. The goal is formulated in the manner to ensure that by the

concept implementation, energy availability is ensured for all end-users in real time and under an economically-effective principle.

Gross domestic consumption of energy[1)] and energy intensiveness[2)] are the basic indicators for international benchmarks.

Overview of basic development indicators characterising gross domestic consumption of energy is available in Annex 2.

2.1. Objectives and Priorities of the Energy Policy of the Slovak Republic for the Period up to 2020 and with the Outlook up to 2030

The objective of Slovakia's Energy Policy in a long-term horizon is to:

1. ensure sufficient volume of electricity production to meet demand on an economically-effective principle,
2. ensure, at maximum efficiency, safe and reliable supply of all forms of energy in requested quantity and quality,
3. reduce the share of gross domestic consumption of energy in gross domestic product – decrease energy intensiveness.

The following priorities have been set to facilitate meeting objectives of the Energy Policy:

1. replace to-be-closed electricity production plants in the way so as to ensure production of electricity volume sufficient to primarily cover the domestic demand, on an economically-effective principle,
2. adopt measures focusing on energy savings and increasing energy effectiveness on the consumption side,
3. decrease dependency on energy supplies from risk-borne regions – diversification of acquiring energy sources as well as transport routes,
4. utilise domestic primary energy sources for electricity and heat production, on economically-effective principle,
5. increase utilisation of combined production of heat and electricity,
6. utilise nuclear power industry as a diversified, economically efficient and adequately environmentally acceptable option for electricity production,
7. ensure nuclear power plant operation safety,
8. increase the share of renewable energy sources in electricity and heat production in order to create adequate additional sources necessary for coverage of domestic demand,
9. complete the plant and network construction in order to facilitate safe and reliable transport, transmission and distribution of electricity and gas,
10. build new transmission trunks in order to improve connection with the EU internal market as well as third countries market,
11. support utilisation of alternative fuels in transportation.

2.2. Bases for achieving the Energy Policy objectives – resources and needs balance

The Slovak Republic gains almost 90% primary energy sources by acquisition from outside the territory of the EU internal market. The only rather substantial domestic energy source is lignite (brown coal), as domestic natural gas and oil production is insignificant. It is

1) Gross domestic consumption represents primary production (primary production comprises fuel production, electricity produced in hydro-electric power plans, heat produced in nuclear power plants) and geothermal heat, renewed products, import and export balance and stock level change

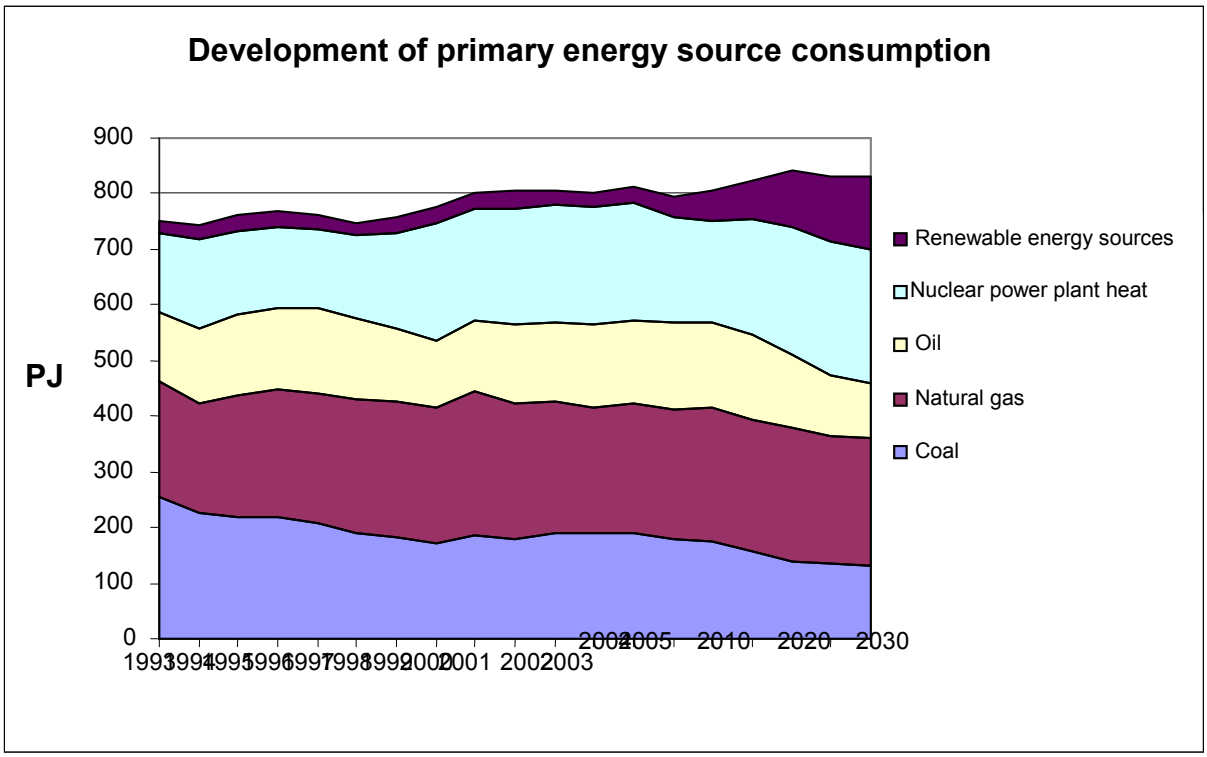
2) Energy intensiveness is defined as gross domestic consumption of energy divided by gross domestic product

because of this reason that the meaning of renewable energy sources ever increases (biomass, water, geothermal energy, solar energy, wind energy).

Based on analyses we can anticipate that in long-term perspective (up to 2030), that the key role in saturating consumption needs will be played by higher utilisation of nuclear fuel, natural gas and renewable energy sources. Such development trend is based on the assumption that as a result of stricter emission limits, coal consumption will be gradually decreasing. The same scenario we may apply also in case emission limits do not draw back coal utilisation in sufficient volume. Owing to replacement of oil derivatives with bio-fuels, only mild growth of oil consumption is expected, mostly in transportation.

Based on long-term forecasts of gross domestic consumption, it is possible to anticipate the following structure of primary energy sources consumption.

Figure 1



Source: Ministry of Economy of the Slovak Republic

Anticipated development of individual primary energy source types:

COAL

At present, domestic supplies of lignite (brown coal) amount to some 79% of lignite consumption necessary for production of electricity and heat. It plays an important role in ensuring safe electricity supply. The remaining required volume of lignite and the entire required volume of black coal is catered for by means of import.

Table 1 Anticipated development of lignite (brown coal) production by 2030 **(in kt)**

	2005	2010	2015	2020	2030
Lignite (brown coal) production	2400	2400	2100	1800	900

Source: MINISTRY OF ECONOMY OF THE SLOVAK REPUBLIC

In lignite (brown coal) production, gradual decrease is anticipated and from the long-term viewpoint it is not possible to consider lignite production to be sufficient to cover requirements concerning electricity and heat production. National supplies of lignite, however, remain the only non-renewable source necessary to ensure reliability of the entire system.

The resource policy of the Slovak Republic with respect to mineral resources approved by Resolution of the Government of the Slovak Republic No 722/2004 substantiates the national interest in further effective utilisation of this energy source. Utilisation of national supplies of coal in production of electricity for the period from 2005 to 2010 is general economic interest in the field of power industry, which was also approved in Resolution No 356/2005 by the Government of the Slovak Republic. To ensure the required quantity of coal for electricity production, it will be necessary to open coal supplies in mining fields of originally three separate mines (this concerns making available supplies in already opened coal beds by means of new opening and preparatory works).

NATURAL GAS

Annual natural gas consumption makes up some 7bn sq. m., out of which national gas production represents some 3 %. The remaining volume is imported from the Russian Federation.

Table 2 Anticipated development of natural gas consumption by 2030 **(bn. sq. m.)**

	2005	**2010**	**2020**	**2030**
Total natural gas consumption	6,5	6,9	7,0	7,1

Source: MINISTRY OF ECONOMY OF THE SLOVAK REPUBLIC

In the future period, slight growth of natural gas consumption is anticipated, mostly owing to increased industrial consumption and consumption spent on electricity and heat production. Gas utilisation is favourable also due to minimum environmental impact. The above assumption is based on the fact that the natural gas price ration compared to other primary sources is retained. In case of a significant change of natural gas price change, also changes in the total consumption may be assumed.

OIL

Annually, Slovakia imports oil in the volume of some 5.5mio t. The volume is guaranteed on the basis of a long-term international contract with the Russian Federation. From the oil volume import, some 3.2mio ton is used to cover domestic consumption. National oil production contributes to the total oil consumption at some 2 %.

The oil security, ensuring oil supply and related activities in times of an oil crisis are set by respective legal regulations of the Slovak Republic. As of now, Slovakia does not meet the obligation of 90 day reserves in oil and oil products, as in 2004 the reserves totalled at 55 days. It is anticipated that in 2005 the reserves will reach the total of 64 days, in 2006 the total of 73 days, in 2007 the total of 82 days and in 2008 the target will be met totalling at 90

days. Achieving the objective of 90 day reserves has been set for 1 January 2009, which will require construction of underground storage capacities.

NUCLEAR FUEL

At the moment, more than 55% electricity is produced in nuclear power plants. Nuclear fuel supplies are ensured via long-term contracts with the Russian Federation. It is appropriate to support transition to enhanced fuel with better utilisation of nuclear material in nuclear fuel resulting in decreased consumption per unit of electricity produced. With respect to closing of Power plant V1 in Jaslovské Bohunice (JE V1), nuclear fuel supply will decrease until new power plant blocks are potentially launched into operation.

In relation to utilisation of nuclear fuel for electricity production, the key question lies in storage of atomic waste as well as disposal of closed atomic power plant equipment ("APPE"). Resolving this issue, the Slovak Republic will act in accord with the EU policy taking into account maximum safety and reliability of atomic energy utilisation in all phases of APPE lifecycle.

RENEWABLE RESOURCES

Currently, renewable resources are used in relation to production of some 5.2 TWh (including large hydroelectric power plant potential), which stands for some 16% household electricity consumption. The total available potential of individual types of renewable energy sources enables to increase their share in the overall electricity production to as much as 19% in 2010, 24% in 2020 and 27% in 2030.

The most promising renewable source for heat production is biomass, with the total potential p.a. suitable for energy production purposes is some 75.6 PJ. Biomass is also a prospective source for electricity production.

Despite the above, hydroelectric potential remains the highest utilisation rate source. As far as other renewable sources are concerned (wind energy, geothermal energy, solar energy), their utilisation will be exclusively additional owing to safety and reliability of electricity and heat supplies while the question of cost of electricity and heat produced from renewable sources remains an important factor.

It is necessary to monitor impact of energy-related legislation and financial instruments on facilitation of renewable energy sources utilisation, to analyse barrier barring its utilisation as well as adopt respective measures to remove such barriers. The principal measure to increase the share of renewable energy sources ("RES") in the overall electricity and heat consumed lies in amending appropriate legislation leading to their increased utilisation. It is necessary to review support to be dedicated to renewable energy sources within the fame of the overall economic interests in the field of power engineering. Decreasing dependency on oil in motor fuel production as well as increase of energy effectiveness of individual transportation types provides for room for utilisation of renewable and unconventional fuels in transportation, too. The most promising alternative of oil is bio-fuels. Indicative targets of their utilisation, set on the basis of energy content of motor fuels, anticipates in 2010 use of such bio-fuels at the rate 5.75%, with further increase of their share in the total bulk expected after 2010.

Table 3 Available potential of renewable resources

Source	Available potential	
	PJ	GWh
Water energy	**23,8**	**6 600**
Large hydro-electric power plants	*20,2*	*5 600*
Small hydro-electric power plants	*3,6*	*1 000*
Biomass	**75,6**	**21 000**
Dendromass	*47,0*	*13 055*
Agricultural biomass	*28,6*	*7 945*
Bio-fuels	**5,0**	**1 389**
Biogas	**6,9**	**1 917**
Wind energy	**2,2**	**600**
Geothermal energy	**22,7**	**6 300**
Solar energy	**18,7**	**5 200**
TOTAL	**154,9**	**43 006**

PJ = Peta Joule

Source: MINISTRY OF ECONOMY OF THE SLOVAK REPUBLIC

Specification of intents and targets related to electricity production from renewable energy sources is included in Annex 3.

2.3. Electricity Consumption Development

The Slovakia's population living standards as well as achieving standards comparable with those of the EU developed countries is, among other things, impacted also by sufficient volume of electricity at cost ensuring not only the economy competitiveness but also its availability for the population.

The economy growth over recent years has been achieved also by decreasing energy intensiveness, which can be demonstrated also with the total electricity consumption indicator which increased in 2004 by 6.5% against 1995 while GDP rose over the same period at 1995 constant prices by 35.7%.

Further development of electricity consumption is a significant factor for strategic planning on all levels. Electricity consumption is affected with several factors, with the key one being the cost. Anticipated electricity consumption development covering longer period, therefore, has a significant uncertainty rate imbedded.

The assumed development of total electricity consumption has been based on its year-on-year increase by 1.2%, with such growth reflecting economy measures on the consumption side.

The input data was based on past production development trends with the starting point set to be the data from 2001, i.e. maximum production 32 TWh, which was gradually decreased in the following years due to closing of electrical energy production sources. By the

2008 end, such decrease will stand for 7.2 TWh. Together with assumed electricity production development, also impacts of measure aimed at increasing production source performance have been taken into account as well as measures aimed at new production sources construction.

Table 4 Anticipated development of total electricity consumption and maximum possible production of electricity (in TWh)

	Consumption	Production	Variance
2006	29,4	31,0	1,6
2007	29,7	28,4	-1,3
2008	30,1	28,7	-1,4
2009	30,5	26,1	- 4,4
2010	31,0	26,5	-4,5
2015	32,9	38,1	5,2
2020	34,8	38,1	3,3
2030	38,0	35,5	- 2,5

Source: MINISTRY OF ECONOMY OF THE SLOVAK REPUBLIC

The anticipated possible electricity production volumes indicate that, gradually from 2007 up to 2010, electricity production will not cover the anticipated consumption.

After closing JE V1, despite measures aimed at increasing existing capacity performance, it will not be possible, without new production capacity construction, to saturate estimated electricity consumption need even if all measures driving the overall electricity consumption decrease are implemented. In order to meet targets of the Energy Policy – to ensure production of electricity in a volume to satisfy the demand on an economically-effective principle – it will be necessary to replace the closed JE V1 with a reliable source being capable to ensure electricity production on an economically-effective principle.

Due to the termination of electricity production at JE V1, it will be necessary to address the interim deficit regarding electricity production and consumption. This may be resolved as follows:

- acquire electricity from internal EC market,
- acquire electricity from third markets,
- adopt measures aimed at electricity consumption decrease,
- adopt measures aimed at increase of performance of existing production facilities.

The key question for making a decision related to option(s) to be implemented is:

- electricity cost and its future development trend forecast,
- transmission plant capacity – capability to conduct international transport of electricity,
- impact of measures aimed at electricity consumption decrease,

Simultaneously, it will be necessary to ensure utilisation of renewable energy sources in a larger extent.

It is anticipated that in 2015, after launching the nuclear power plant JE Mohave (EMO) 3 and 4 into operation and following implementation of new facilities utilising renewable energy sources, Slovakia will see a temporary electricity excess in production. After 2020, owing to closing JE V2 due to its lifecycle completion, the electricity excess in production will be over.

3. ENSURING TARGETS OF THE ENERGY POLICY – PROPOSAL OF FORMS AND STEPS TO ENSURE TARGETS

3.1. Ensuring production of electricity necessary to saturate demand

Achieving one of the principal target of the Energy Policy, namely to ensure production of electricity in volume saturating the demand on economically-effective principle, will be only possible by catering for sufficient production resources for its production. This key target of the Energy Policy can be met by:

- increasing performance of the existing production facilities,
- construction of new production facilities.

Increasing performance of existing production facilities will require implementation of measures related to the following sources, currently existing:

- nuclear power plant V2 in Jaslovské Bohunice,
- nuclear power plant in Mohave 1 and 2,
- thermal power plant in Novak,
- thermal power plant in Vojany.

Decisions on measure aimed at construction of new production facilities will be based on assumption concerning a role f individual energy sources in saturating the demand in the future. As promising, the following production facility types are deemed :

- nuclear power plant – completion of construction of EMO 3 and 4,
- construction of hydro-electric power plant on the river Ipeľ, or potentially on another river,
- power plants utilising renewable sources, e.g. biomass, solar energy, wind energy,
- power plants with combined production of electricity and heat,
- thermal power plant.

When taking an ultimate decision on a given measure with the view to meet the Energy Policy goals, economic efficiency of a solution proposed will be taken into account as well as return on investment dedicated to the implementation.

Detailed information concerning development plans aimed at increasing the capacity of existing production resources as well as construction of new ones, including anticipated increases of performance and electricity production are included in Annex 4.

3.2. Safety and reliability of supplies of all forms of energy in required quantity and quality

Each state has the mission to ensure safe, reliable, technologically and technically developed, environmentally acceptable and economically efficient operation of energy

distribution plant and network. This task can be accomplished predominantly by measures aimed at increasing safety and operational reliability of the plant and network.

ELECTRICITY

In relation to closing of the nuclear power plant V 1 in Jaslovské Bohunice, it will be necessary to ensure improving capacity of transmission routes, namely by means of:

- construction of new routes,
- increase of transmission capacity of existing routes,
- construction of new international transmission trunks.

To ensure safety and reliability of electricity supplies, optimisation of management of transmission plant in real time plays an important role. This will require predominantly modernisation of the management, information and telecommunication system necessary for the transmission plant management.

Increasing reliability of supply, ensuring quality and environmental protection will call for adoption of measures aimed at development of distribution plants to be able to observe electricity supply quality for the end user as well as to provide related services on economically-efficient principle. This will necessitate mostly construction, reconstruction and regular maintenance of routes, distributors and transformers as well as introducing progressive management and information systems.

Also, monitoring the offer and demand is of key significance for the production, transport and distribution of electricity, to create prerequisites for resolving imbalance in real time.

Development plans aimed at ensuring safety and reliability of electricity supplies are included in Annex 5.

NATURAL GAS

Safety of supplies plays the key role also with respect to natural gas. Supply safety is to a great extent affected also by sufficient capacity of underground tanks as well as mutual interconnectivity of individual transport networks. New investment allocation will have to be focused mostly on development of networks and increase of their safety.

As much as 90bn. sq. m. natural gas is transported across the territory of Slovakia *per annum*, which at the same time an important aspect for gas supply safety. In future, further development of this transport plant is anticipated since its capacity can be increased at relatively low investments (compared to new routes).

As far as domestic gas supplies are concerned, the assumptions are based on the fact that in future the share of domestic gas sources in the whole will remain relatively low, which does not mean, however, that these sources will not be used. Their utilisation is conditioned by economic effectiveness.

Long-term contracts are a very important aspect of gas supplies within the EU. These should be retained as an option for gas companies in planning their supplier and transport capacity.

From the view point of decrease of unilateral gas import dependency, it is necessary to support possibilities of increasing natural gas supply security by means of obtaining a part of supplies from other sources or by different transport routes. When deciding on arranging gas supplies from other sources or by new transport routes, an important factor will be the cost of natural gas, i.e. economic effectiveness of gas supplies from a diversified source. Resolving

the issue of gas supply diversification will be reviewed on two levels, on technical and commercial one. Slovakia has interest in participation in projects resolving alternative options of gas supplies for European countries including Slovakia. It is appropriate to seek possible utilisation of construction projects concerning such gas distribution systems also for the Slovakia's gas market.

As a part of opening the natural gas market, the prospective project participation includes:

- joint gas and logistics commercial centre in Austria,
- gas distribution system Nabucco, with the route from the eastern border of Turkey to Austria and is a joint project of Austria, Hungary, Rumania, Bulgaria and Turkey.

From the viewpoint of gas supply safety, supply safety as well as technical security of gas distribution facilities is at stake.

In relation to preparation of the EU legislation with the objective to create a minimum common standard for supply safety, it will be necessary to resolve the question of scope of activities and responsibility of individual gas market players and to ensure that in specific cases, natural gas supply continuation is ensured mostly for household and/or for small enterprises, which has no possibility of fast migration to another energy source.

When ensuring safe and reliable natural gas supply in sufficient volume for all consumer segments, in the future it will be important to monitor the supplies, namely:

- balance of offer and supply of natural gas on one hand and demand and consumption of natural gas on the other hand,
- level of expected future natural gas consumption as well as available supplies,
- anticipated and planned transport, distribution and storage capacities,
- measures to deal with natural gas consumption peak,
- measure to tackle interruptions in natural gas supply,
- ensuring technical security of gas distribution facilities,
- quality and maintenance level of networks.

Monitoring gas supply safety should be conducted in time to enable adopting appropriate measures in case supply safety is jeopardised.

Instruments currently available, contributing to supply safety, are underground gas tanks with the capacity of approximately 2.5bn sq. m. and long-term contracts. With regards to future, it is necessary to support also making use of cooperation among gas industries of the neighbouring states, development of interruptible supply and making use of offer of liquidity gas market. Another solution aimed at ensuring gas supply stability is construction and maintenance of network infrastructure as well as construction of new interconnection capacities.

Development plans aimed at ensuring safety and reliability of gas supplies are included in Annex 5.

OIL

Oil is transported from the Russian Federation via the Družba pipeline with the capacity of 21mio ton p.a. As an alternative, Slovakia is served also by the Adria pipeline

with the capacity of 4.5mio t p.a. Parallel utilisation of both pipelines Adria and Družba is possible. In case of interconnection of the Adria pipeline with the planned Rumanian-Serbian-Croatian-Italian pipeline Constanza–Terst, Slovakia could become a player in transport of Caspian oil. Another possibility is obtaining supplies for Slovakia via the IKL-Družba pipeline system on the condition of reverse oil flow in the section to the Czech Republic (simultaneously excluding the possibility of obtaining oil supplies via the Družba and Adria pipelines), over which it may be possible to access, upon fulfilling certain conditions, also oil of origin other than that of the Russian Federation. This is conditioned by outcome from negotiations with operators in the Czech Republic and subsequent implementation of a technical solution of reverse flow in the pipeline.

From the viewpoint of decreasing unilateral oil import dependency, it is necessary to support possibilities of increasing oil supplies safety by arranging a portion of supplies from other sources or via different transport routes. Slovakia has interest in participation in projects resolving alternative options of oil supplies for European countries. This namely concerns implementation of the Odessa-Brody project for transport of Caspian oil to Europe as well as implementation of Bratislava–Schwechat connection project.

HEAT

Heat supplies make up for a significant part of the Slovak power industry. Until 90´s, emphasis was put on centralised heat supply ("CHS"), which met the principle of efficient utilisation of energy. Deformed electricity and natural gas prices for households has lead to the tendency to disconnect from CHS and opt for individual heating based on gas or electricity. This situation, however, has been recently changing significantly, owing to gas price increase.

At present, still more than 85% apartment blocks are supplied with heat from public power industry, which includes CHS, block heating plants and heat supplies from industrial companies.

Heat production is ensured also at own central energy sources of industrial companies. Heating plants of industrial companies and public energy industry, in which most efficient method of utilisation of fuel is applied at combined production of electricity and heat. Over the recent period, general interest in construction of smaller combined electricity and heat production units, has increased. This trend is expected to develop further.

Development of Slovakia's heat industry in medium and long term will focus on more extensive utilisation of renewable resources based on use of biomass and geothermal energy. The prerequisite for this assumption to become true is motivating heat price. Utilisation of such sources is also possible owing to implementation of new technology equipment in CHS with high performance. More significant use of solar collectors, which are today used rather rarely, is also anticipated.

3.3 Decreasing Energy Intensiveness and Increasing Energy Effectiveness

3.3.1 Decreasing Energy Intensiveness

Decreasing energy intensiveness is one of the key pillars of sustainable development. Sustainable development must support the existing needs of the population not restricting the possibility of future generations to satisfy their needs. To achieve sustainable development, it is necessary to:

- change production technologies on the side of production and consumption,
- change procedures and habits on the side of production as well as consumption.

In order to ensure development of the Slovak Republic it is necessary that sustainable development also comprises sustainable energy production solutions and technologies utilising domestic available energy sources.

Affecting volume of energy consumption in order to decrease energy gross domestic consumption can be achieved mostly by preferring investments ensuring higher energy efficiency to measures related to additional investments into production capacity increase or measures aimed at energy supply interruptions; especially in case such preferred investments constitute more effective and economically more advantageous solution with the view to positive environmental effects.

Decreasing energy intensiveness in a long-term horizon will also bring about decrease of negative environmental impacts predominantly decrease of greenhouse effect emissions thus fulfilling obligations arising from the Kyoto protocol. Environmental impact of power industry is described in Annex 6.

3.3.2 Increasing Energy Effectiveness

One of the possibilities to decrease energy intensiveness is to increase energy effectiveness. Energy effectiveness is a cross-industry phenomenon affecting all areas of the economy thus covering measures aimed at energy savings on the production side as well as on the side of consumption.

Increasing energy effectiveness is a result of several decisions, mostly on the part of state and public administration, third sector, consumers themselves as well as appliance manufactures; including the production side, mostly in terms of using new available technologies and measures aimed at savings in energy transport, transmission and distribution. In the end, energy effectiveness increase will be noticed as overall energy saving.

By increasing energy effectiveness, decrease of consumption of energy primary sources will be achieved, which will result in decrease of import dependency, negative environmental effects as well as decrease of energy price effect on consumers.

Measures aimed at increasing energy effectiveness will be as follows:

- information campaign with the objective to dissemination of information on energy consumption,
- creating room for comfortable and effective energy-related services,
- determination of standards of energy effectiveness of appliances,

- support to research and production of equipment and innovative technologies with high energy effectiveness.

Further specific measures aimed at increasing energy effectiveness are included in Annex 7.

4. ROLE OF RESEARCH AND DEVELOPMENT IN POWER INDUSTRY

Research and development in the power industry are, in each economy, assigned priority interest. Currently, the key problem of research and development in power industry is low financing and the fact that that within the economy industry, no separate scientific centre has been created for research and development in power industry.

In the past, research focused mostly on the field of nuclear power industry as well as coal, gas and hydroelectric sources. Research and development in the area of renewable resources was insufficient. Ensuring appropriate development in the field, due to various forms of these sources, is extraordinarily demanding. Without support, one can hardly imagine an overall and most of all successful solution in this area.

Research and development activities were financed from the state budget by means of "State research and development programmes" and "State orders to research and development". For the field of power industry, multi-institutional state programme has been set up for research and development "Application of progressive principles of energy production and transformation" for the period 2002-2005 with further outlook from 2010.

The focal priority of research and development will be areas in power industry bringing in national benefit and the result of which will be introduction of technologies, which will increase competitiveness of the Slovak economy. Individual projects in the field of international cooperation will be supported with resources from the structural funds. More detailed specification of research and development in power industry is included in Annex No 8

5. FINANCING MEASURES UNDER THE ENERGY POLICY

Implementing some measures aimed at achieving targets of the Energy Policy in a long-term horizon cannot be done without direct support by means of funds from public resources.

This requirement is especially topical with respect to implementation of measures aimed at:

- utilisation of renewable sources for electricity and heat production,
- increasing energy effectiveness,
- decreasing energy intensiveness,
- research and development in power industry,

Possible sources for financing projects in the respective areas are represented by resources of:

- parties implementing projects,
- EU structural funds,
- state budget,

- resources obtained by employing the method Public - Private - Partnerships,
- alternative financing – third party financing.

Specific plans concerning financing of projects from the structural funds will be included in the financial perspective for the period 2007 -2013. As far as state budget funds are concerned, compliance to state support rules as well as economic efficiency will be taken into account.

Besides the issue of financing, another key aspect regarding utilisation of renewable sources for electricity and heat production is pricing policy enforced by the regulator. Therefore, in the period to come, the primary intention in this area will be to create room for regulatory framework stability, its specification for a longer term (more than 5 years) so as to ensure adequate return on investment. In this manner, the institution implementing individual measures will have clear rules for calculation of return on investment made.

x x x

The Energy Policy of the Slovak Republic is a high-level document stipulating the starting point for orientation of individual players on the Slovakia's energy market for a longer period. It is a document open to any changes which may arise in the course of implementation.

ANNEX NO. 1

Review of the implementation of measures arising from the Energy Policy of 2000

Progress in energy policy tasks:

1. Task: Submit to the Government information about safeguarding fuel supply for Slovakia in 2000-2005. T: 30.06.2000
   Progress: presented by the Minister of Economy on 27.06.2000.
2. Task: Submit to the Government information about the programme of further coal extraction in Slovakia, including the pilot programme for state participation in the shutdown of the Dolina Mine. T: 31.05.2000

Progress: presented by the Minister of Economy in the Report on the Phase-out of Mining Activities and Shutdown of the Dolina Mine on 27.06.2000.

3. Task: Submit to the Government a draft concept of the steps, timetable and economical procedure for the disposal of spent nuclear fuel and the procedure for the decommissioning of nuclear energy facilities. T: 30.10.2000
   Progress: presented by the Minister of Economy on 31.10.2000.
4. Task: Create conditions for electricity consumers to be able to choose their electricity supplier from among electricity production licence holders in the Slovak Republic in accordance with the annex to Resolution No. 5/2000. T: according to the deadlines specified in the annex to the Resolution

Progress: the conditions for choosing the electricity supplier were specified in Ministry of Economy Decree No. 562/2001 laying down the minimum amount of annual electricity and gas consumption for eligible consumers and the details of the rules of electricity and gas transit to eligible consumers.

5. Task: Submit to the Government a proposal to complete or halt the construction of the 3rd and 4th units of the Mochovce nuclear power plant. T: 31.03.2000
   Progress: presented by the Minister of Economy on 31.3.2000.
6. Task: Prepare a proposal modifying consumer categories and tariffs in the electricity and gas sectors. T: 31.03.2000
   Progress: the proposal was prepared and sent to the Ministry of Finance on 30.03.2000.
7. Task: Initiate an amendment to Budgetary Rules Act No. 303/1995 Coll. so that the method of "third party financing" or "contractual energy supply and services" can be applied in budgetary and contributory organisations implementing energy efficiency projects until the project is repaid. T: 30.04.2000
   Progress: implemented through a letter from the Minister of Economy to the Ministry of Finance dated 28.04.2000.
8. Task: In the context of reorganisation of state administration, consider the possibility of transferring the competence to issue prior consent to the construction or shutdown of heat production facilities to self-governing authorities.
   Progress: Act No. 276/2001 Coll. transferred this competence to the Office for the Regulation of Network Industries and Act No. 657/2004 Coll. replaced prior consent with a certificate of compliance with the long-term energy policy granted by the Ministry of Economy.
9. Task: Prepare an environmental assessment of the utility of the Slovak Republic's hydro-energy potential. T: 31.12.2000
   Progress: presented by the Minister of Economy on 19.12.2000.
10. Task: Submit to the Government a draft concept for accumulating a 90-day supply of crude oil and petroleum products and addressing emergency situations. T: 29.02.2000
    Progress: presented by the Chairman of the State Material Reserves Administration on 29.02.2000.

11. Task: Prepare the introduction of short-term reporting for the energy sector in accordance with the EU and IEA methodology. T: from 01.01.2001

Progress: short-term reporting was introduced into Slovakia's official statistical reporting on 01.01.2001.

12. Task: Elaborate programmes to promote the rationalisation of fuel and energy consumption in relation with the competences in individual sectors. T: 30.06.2000

Progress: the programmes were elaborated by individual sectors in co-operation with the Ministry of Economy. The Ministry also prepared its own promotion programme involving approx. SKK 30 million annually.

All of the documents are available to the public at the Ministry of Economy.

ANNEX NO. 2

Trends in selected indicators: Gross domestic energy consumption, gross domestic product and energy intensity

1. Trends in gross domestic energy consumption

The term gross domestic energy consumption was introduced into energy statistics in 2002 and replaced the previously used primary energy sources (PES) indicator. At the same time, methodology changes arising from the regulations and requirements of the European Union and the International Energy Agency were implemented. Gross domestic energy consumption includes primary production[1] in the Slovak Republic (brown coal, lignite, crude oil, natural gas, heat and electricity) and is adjusted for renewed products, the balance of imports and exports and the use of reserves. It also includes the balance of imports and exports and use of reserves of other sources, such as black coal, coke, brown coal briquettes, naphtha, gasoline, light and heavy fuel oil, kerosene, coke-oven gas, blast furnace gas and other solid, liquid and gas fuels.

Tab. no. 2.1 Trends in gross domestic energy consumption

Indicator	1993	1994	1995	1996	1997	1998	1999	2000	2001*	2002	2003
Gross domestic consumption (in PJ)	755	744	766	780	777	756	761	768	792	791	798

Source: Ministry of Economy
PJ – petajoules
*new methodology

TAB. NO. 2.2 ESTIMATES OF GROSS DOMESTIC ENERGY CONSUMPTION

Indicator	2004	2005	2010	2020	2030
Gross domestic consumption (in PJ)	806	808	801	836	831

Source: Ministry of Economy

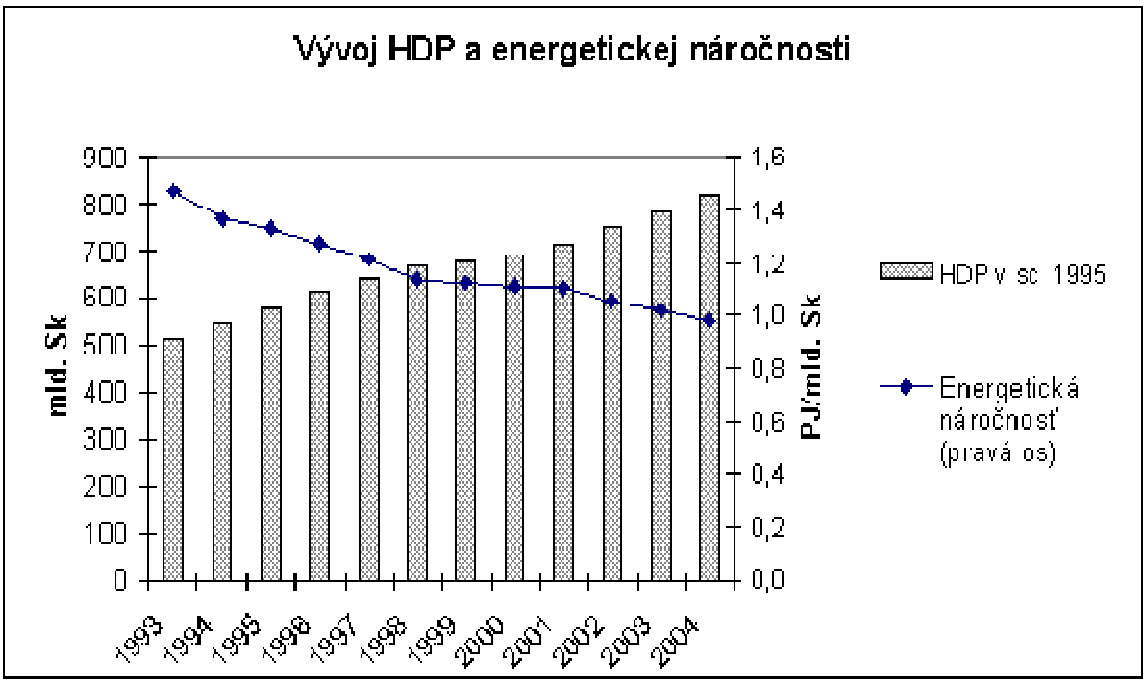
The estimate of the trends in gross domestic energy consumption until 2030 is based on its moderate growth. The estimate is derived from the assumption that, until 2015, GDP growth will be faster than the decrease in energy intensity, while the reduction in energy intensity is expected to be faster than GDP growth after this year.

2. Trends in gross domestic product and energy intensity.

Energy intensity, defined as the ratio of gross domestic energy consumption and gross domestic product, is an important economic indicator, which is also used for international comparison.

[1] Primary production of electricity mainly means electricity generated from hydro and wind sources. Primary production of heat means heat generated in nuclear power plants and from geothermal energy.

Chart 2.1



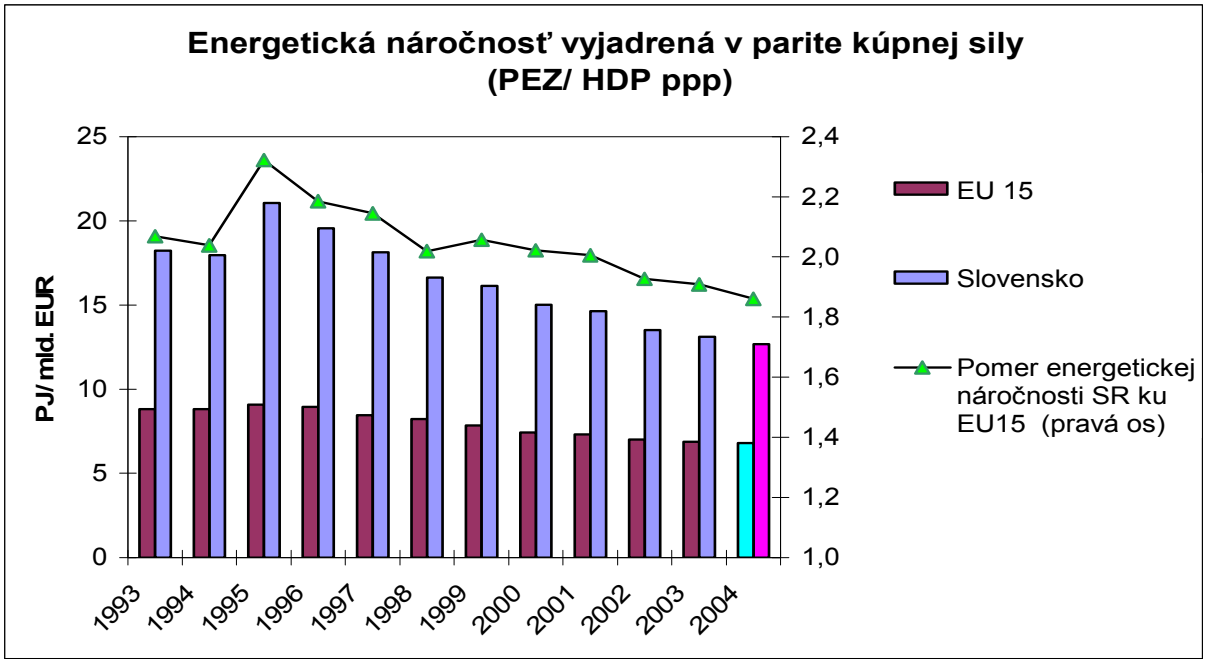
Source: Ministry of Economy

Chart 2.1. shows the trends in GDP in fixed prices of 1995 and the trends in energy intensity, which suggest that GDP growth was accompanied with a balanced consumption of energy sources in the preceding period. Energy intensity has been steadily declining by 4% annually since 1993, which was caused above all by the growth of production with a higher added value and the introduction of austerity measures on both the production and consumption sides.

It was estimated that energy intensity will reach the value of 1.0 PJ per billion SKK in 2004, that is, that it would be necessary to consume 1 PJ of energy to generate SKK 1 billion in fixed prices. Whether this estimate was correct will be seen after the Slovak Statistical Office has processed the statistical data for 2004. These trends indicate the gradual transition of our economy away from energy-intensive production.

3. Energy intensity in terms of purchase power parity

Chart 2.2



Source: Ministry of Economy

Tab. no. 2.3 Ratio of energy intensity in Slovakia and the EU-15

Indicator	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ratio of energy intensity in Slovakia and the EU-15	2.07	2.04	2.32	2.18	2.14	2.02	2.06	2.02	2.01	1.93	1.91

Source: Ministry of Economy

In order to compare our energy intensity with the EU-15, it is more convenient to use GDP expressed in purchase power parity rather than GDP in fixed prices. Chart 2.2. indicates that energy intensity in Slovakia calculated in this way has been constantly decreasing since 1995. Our energy intensity was 2.3 times higher than the EU average in 1995 and only 1.9 times higher in 2003. Despite these positive trends, our energy intensity continues to be high due to the fact that industry is still a large component of gross domestic product. In order to reach the energy intensity level of the EU-15, it is necessary to continue to reduce this proportion.

- **Tab. no. 2.4 Estimate of the trends in energy intensity until 2030**

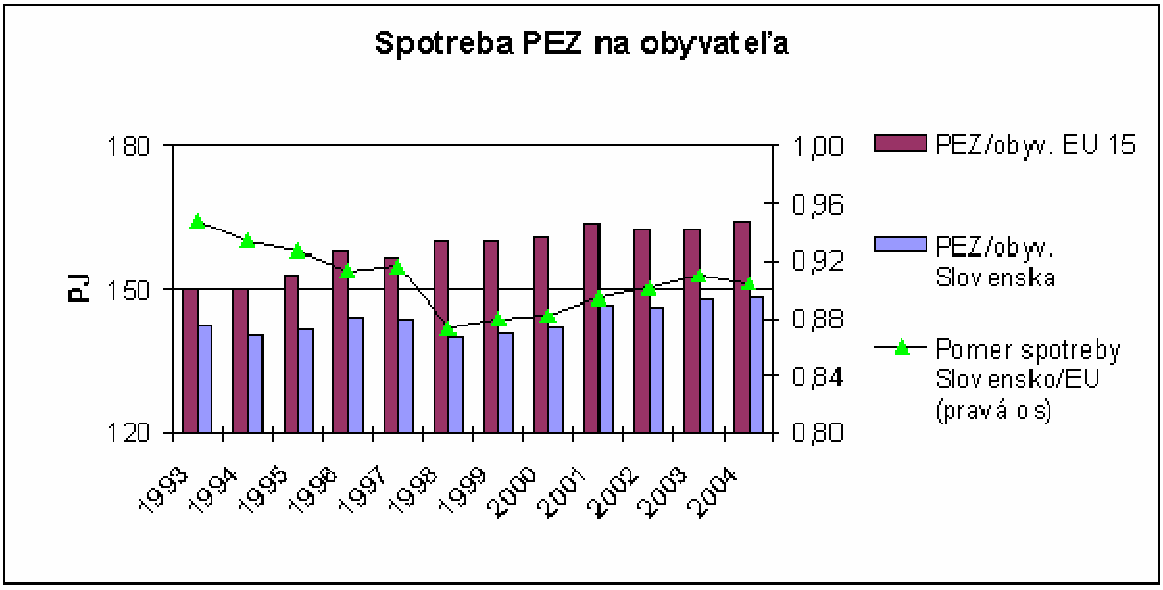
Indicator	2004	2005	2010	2020	2030
Ratio of energy intensity in Slovakia and the EU-15	1.85	1.80	1.60	1.30	1.10

Source: Ministry of Economy

Even though energy intensity is expected to decline further by 2030, it will continue to be higher than in the EU-15.

4. Per capita consumption of primary energy sources since 1993 and comparison with the EU-15.

Chart 2.3



Source: Ministry of Economy

Chart 2.3. compares the per capita consumption of PES in the Slovak Republic and the EU-15. The per capita consumption of primary energy sources in Slovakia continues to be lower than in the EU-15 and amounts to less than 150 PJ. Even though a slight increase was recorded in the recent period, it still does not exceed 90% of the European Union average.

Tab. no. 2.5 Final energy consumption

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
FEC – Final energy consumption (PJ)	545	507	512	519	499	500	491	473	461	464	444

Source: Ministry of Economy

The figures on the trends in final energy consumption suggest that final energy consumption has been steadily decreasing every year. The reason for this situation is the gradual implementation of austerity measures on the consumption side.

Tab. no. 2.6 Estimate of final energy consumption

	2004	2005	2010	2020	2030
FEC – Final energy consumption (PJ)	450	455	460	470	480

Source: Ministry of Economy

The estimate of final energy consumption is based on the following assumptions:

- growth in electricity demand due to the launch of production in new production plants,
- increase in household electricity consumption,
- increase in fuel consumption in transport.

The estimate of the trends in final energy consumption took the implementation of measures aimed at reducing final consumption into account.

ANNEX NO. 3

Specification of the objectives and goals for greater use of renewable energy sources

a) Electricity production

In July 2004, the Government debated and approved the document "Progress Report on the Development of Renewable Energy Sources, including the Identification of National Indicative Targets for the Use of Renewable Energy Sources". According to this document, based on our natural and economic conditions, it is realistic to produce approx. 5.9 TWh in 2010. This includes the whole electricity production in the Gabčíkovo hydropower plant, including Hungary's share.

- **HYDRO ENERGY**

The technically feasible hydro energy potential for the production of electricity is 6.6 TWh annually. The annual hydro energy-based electricity production depends on the rainfall in the given year and its value oscillates around 5 TWh (excluding pumped-storage plants). If we include only 50% of the production in the Gabčíkovo hydropower plant (excluding Hungary's share), production amounts to roughly 3.8 TWh, meaning that the potential is utilised at the level of 58%.
The development objectives include:

- the construction of a hydropower plant on the Ipeľ river,
- the construction of a hydropower plant in the Nezbudská Lúčka locality near Strečno on the Váh River and construction of the Sereď hydropower plant,
- construction of small hydropower plants (SHPP) with capacities of 1 - 3 MW, especially on the Hron and Váh Rivers,
- construction of SHPP with capacities of up to 1 MW on other watercourses, with the exception of the Orava River.

- **Biomass**

The development objectives include:

- combined combustion of coal and wood chips,
- gasification of wood in thermal power plants,
- the use of biogas in smaller power plants,
- the use of agricultural and forestry biomass for energy purposes.

- **Wind energy**

Only areas with the best wind conditions are suitable for the effective utilisation of wind energy and these are only in a small fraction of the territory of the Slovak Republic (the installation of wind power plants in national parks is impossible). Under the current conditions, electricity production from wind energy is expected to reach 200 GWh by 2010. On the basis of the above, the development objectives can focus on:

- construction of new wind parks,

- enhancement of the capacity of current wind parks (Cerová, Ostrý vrch, Skalité near Čadca).

- **Geothermal energy**

The use of geothermal energy is being considered within the framework of the project dealing with the geothermal source in the Košice basin with electric capacity of 5 MW and estimated electricity production capacity of 40 GWh annually.

- **Solar energy**

Due to its financial costs, the use of solar energy for electricity production is inefficient at present. Only the use of solar energy in locations without access to the electricity grid can be expected in the future.

b) Heat production

- **BIOMASS**

Biomass is a renewable energy source which will gradually replace a significant proportion of fossil fuels used for heat production and transport.

Slovakia's total annual capacity in the production of forest biomass suitable for energy production will reach around 1,080 thousand tons by 2010, which corresponds with 16.9 PJ. It is realistic to increase the amount of forest biomass available after 2010 through more intensive wood cutting and growing of energy crops in an area of 45,400 ha.

Energy crops, such as fast-growing wood plants and annual and multiannual energy crops, are a promising source of fuel biomass. Energy crops can be grown in areas unsuitable for conventional agricultural and forestry production, on land temporarily set aside from agricultural production, contaminated land suitable only for non-food production, as well as on damaged land in industrial agglomerations.

Another source of wood usable for energy production is the wood-processing industry, which produces 1,410 thousand tons of waste annually. The total energy value of usable waste from the wood-processing industry is 18.1 PJ, of which 2/3 originates from mechanical wood processing and 1/3 from black liquor. The greatest waste producers are large wood-processing companies, which also most frequently use this waste for energy purposes.

Another possible source is the production of agricultural biomass – cereal, corn and sunflower straw, winter rape, orchard and vineyard wood waste.

The production of biofuels will increase significantly by 2010 due to the implementation of the objectives set out by Directive 2003/30/EC. The estimated production of biodiesel amounting to 100 thousand tons is equivalent to 11.0 PJ of heat.

The production of biogas from cattle manure can reach 277 million m^3 annually, which corresponds with 6.9 PJ of heat.

Wastewater treatment plants are an important source of biogas. There are currently 24 co-generation units in operation using their own biogas and it is expected that co-generation units will be built at all wastewater treatment plants in larger towns.

Theoretically, biomass with energy equivalent to as much as 46.5 PJ can be produced in agriculture without negatively affecting agricultural production.

Detailed attention to the use of biomass was given in the concept for the use of agricultural and forestry biomass for energy purposes, which was discussed by the Government on 1 December 2004 and approved through Resolution No. 1149/2004.

- **GEOTHERMAL ENERGY**

Geothermal energy is currently being used in approx. 36 localities in Slovakia with heat production capacity amounting to 131 MW_t. The aggregate thermal energy potential of geothermal waters in all prospective areas of Slovakia is 5538 MW_t. The current situation in the use of geothermal energy is unsatisfactory considering the potential that this renewable energy source has to offer.

The largest geothermal deposit with a potential capacity of as much as 300 MW_t is located in the Košice basin.

The usable thermal potential of this geothermal source is estimated at 1200 MW_t.

- **SOLAR ENERGY**

It is estimated that 500 to 700 m^2 of solar collectors was installed annually in Slovakia in the mid 90s, compared with 2000 to 3000 m^2 at the end of the 80s. From 2000 the number of installed solar collectors grew swiftly until the beginning of 2003, when solar collectors were reclassified to the higher VAT rate category, even if they from part of a construction project. This made collectors less advantageous than fossil energy sources and this was probably one of the causes for the stagnation in installation of the collectors.

In 1997, there were approximately 30,000 m^2 of solar collectors in use in Slovakia. The estimated size of solar collectors in use in Slovakia at the end of 2004 was approx. 50,000 m^2 and they were mostly used for the preparation of hot service waster and for heating water in pools. Under these circumstances, their capacity is at the level of 500 kWh/m^2 annually, which is equivalent to 25 GWh of thermal energy or 90 TJ. It is expected that the installation of solar collectors will exceed 5,000 m^2/annually in the years to come.

c) Renewable energy sources and alternative fuels in transport

The basic strategy promoting the use of renewable and unconventional fuels in transport is the strategy for the sustainable development of transport. One of its key attributes is the reduction of dependence on crude oil by using alternative types of motor fuel and increasing the energy efficiency of individual modes of transport.

For the time being, liquefied gas motor fuels – liquefied petroleum gas (LPG) and compressed natural gas (CNG) – are a short- to medium-term alternative in our country to petrol or diesel as cheaper and more environmentally-friendly fuels. Nevertheless, it has to be emphasised that these are fossil fuels whose production is closely related to crude oil extraction and processing, which means that they originate from non-renewable energy sources.

In order to meet the targets under Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport, it is necessary to adopt and implement the "National Biofuels Development Programme". The application of this programme will allow for substantial development in the area of blending bio-components into motor fuels (along the chain of "grower/farmer – processing company – producer of bio-components and fuels – distributor – consumer"). The targets for the use of biofuels arising from the above directive, calculated on the basis of the energy content of motor fuels, are 2% at the end of 2005 and 5.75 % at the end of 2010.

Usable potential of renewable energy sources by individual sources, including estimates of production by 2020

- **Tab. 3.1 Electricity production from renewable energy sources**

Source	Production in 2002
	GWh
Large hydropower plants	4 924
Small hydropower plants	245
Biomass	153
Wind power plants	0
Geothermal energy	0.32
Biogas	6
Solar energy	0.001
TOTAL	**5 328.321**

Source: Ministry of Economy

Tab. 3.2 Estimate of electricity production from renewable energy sources by 2020

Source	Potential usable for electricity production	Estimated production in **2010**	Estimated production in **2020**
	GWh	GWh	GWh
Large hydropower plants	5 600	4 950	5 300
Small hydropower plants	1 000	350	600
Biomass	1 300	350	1 300
Wind power plants	600	200	550
Geothermal energy	60	0	40
Biogas	500	50	500
Solar energy	1 540	0	10
TOTAL	**10 600**	***5 900**	****8 300**

Source: Ministry of Economy

*5900 GWh = 21.24 PJ
*8300 GWh = 29.89 PJ

- **Tab. 3.3 Heat production estimates**

SOURCE	Usable potential	Heat production estimate for 2010	Heat production estimate for 2020
	TJ	TJ	TJ
BIOMASS	75 600	25 000	44 000
of which: Dendromass	47 000	20 000	34 000
Agricultural biomass	28 600	5 000	10 000
Biogas	6 900	2 000	5 000
Geothermal energy	22 700	200 (1000)*	3 000
Solar energy	34 000	300	3 000
TOTAL	**139 200**	**27 500**	**55 000**

Source: Ministry of Economy

* implementation of the geothermal heating project in Košice

- **Tab. 3.4 Estimate of biofuel production**

SOURCE	Estimate of production in 2010	Estimate of production in 2020
	TJ	TJ
BIOFUELS	5 000	15 000

Source: Ministry of Economy

The above estimates of the use of renewable energy sources for the production of electricity, heat and for use in transport in 2010 suggest that they can provide the energy equivalent of 53.7 PJ. This means that they would reach a 6.7% share in the estimated gross domestic energy consumption of 800 PJ. The use of renewable sources in 2020 is estimated to reach 100 PJ, which will represent 12% of gross domestic energy consumption.

ANNEX NO. 4

Development objectives focusing on increasing capacity and constructing new sources

Electricity production facilities produced 30.6 TWh of electricity in 2004. Table 4.1 shows the structure of production facilities by capacity in MWh and annual electricity production by these facilities in TWh:

Tab. 4.1 Structure of production facilities by capacity in MWh and annual electricity production in TWh

Type of production facility	Installed capacity as of 01.01.2004 (MW)	Electricity production as of 31.12.2004 (TWh)
Nuclear	2 640	17.0
Thermal	3 319	9.4
Hydro	2 507	4.2
Other	12	0.03
Total	8 478	30.6

Source: Ministry of Economy

Tab. 4.2 Expected decommissioning of electricity production facilities by year

Production facility	Capacity in MW	Annual production in TWh (estimate)	Year of decommissioning (estimate)
Nováky A power plant	54	0.2	2008
Nováky B power plant	220	0.6	by 2010
Vojany 1 power plant	220	0.7	2006
Vojany 2 power plant	220	0.1	2006
Bohunice nuclear power plant	440	2.8	2006
	440	2.8	2008
Independent producers	200	0.9	2010
Decommissioned in total	1 794	8.1	2010

Source: Ministry of Economy

The decision adopted in 1999 to gradually decommission two units of the V1 nuclear power plant with installed capacity of 880 MW will result in the reduction of electricity production by 5.6 TWh annually by 2008. A further reduction in electricity production of 2.5 TWh can be expected as a result of the decommissioning of certain units of thermal power plants, as well as facilities of independent producers. Based on the above, as a result of the decommissioning of electricity production facilities by 2010 the installed capacity will decline by 1794 MW and electricity production will drop by 8.1 TWh.

If the Slovak Republic continues to have the ambition to be self-sufficient in electricity production, it is necessary not only to consider a substitute for the decommissioned capacity, but also the adoption of measures on the consumption side that will generate savings (implementation of energy efficiency projects) and the implementation of measures aimed at increasing the capacity of existing production facilities by 2010 or the construction of new production facilities.

The increases in electricity capacity and production by 2015 resulting from the implementation of the development objectives focusing on increasing the capacity of existing

production facilities and the construction of new production facilities can be estimated as follows:

TAB. 4.3 ESTIMATE OF INCREASES IN CAPACITY AND PRODUCTION BASED ON INCREASED CAPACITY OF EXISTING PRODUCTION CAPACITY

Increases in the capacity of existing production facilities	Capacity (MW)	Production (TWh)	Estimate of expenditure in billions of SKK at 2005 prices	Expected year of increased capacity and production
V2 nuclear power plant	120	0.7	2.1	by 2010
ENO A – replacement of obsolete boilers	0	0	1.1	by 2008
Units 1 and 2 of the Mochovce nuclear power plant	62	0.4	1.6	by 2012
Total	**182**	**1.1**	**4.8**	

Source: Ministry of Economy

Tab. 4.4 Estimate of increases in capacity and production based on the construction of new production facilities

Construction of new production facilities	Capacity (MW)	Production (TWh)	Estimate of expenditure in billions of SKK at 2005 prices	Expected year of increased capacity and production
Nováky power plant – installation of a fluid boiler	125	0.6	5.4	by 2009
construction of a hydropower plant on the Ipeľ river	600	0.9	11.0	by 2015
Completion of units 3 and 4 of the Mochovce nuclear power plant	942	6.3	45.0	by 2012
Construction of new facilities using renewable energy sources	360	1.5	20.0	by 2015
Construction of new sources for the co-generation of electricity and heat	600	3.6	10.0	by 2015
Total	**2 627**	**12.9**	**91.4**	
TOTAL	**2 809**	**14.0**	**96.2**	

Source: Ministry of Economy

As regards increasing the capacity of existing facilities, it can be expected that the 1st stage of increasing the capacity of units 1 and 2 of the Mochovce nuclear power plant by 44 MW with estimated production of 0.3 TWh will be completed by 2007. The estimate of further increases in capacity and electricity production by the time of decommissioning the V1 nuclear power plant clearly shows that it will not be possible to substitute the drop in the total installed capacity and the Slovak Republic will become an importer of electricity. After the decommissioning of the V1 nuclear power plant and other sources, the installed capacity will decline by 1,374 MW and electricity production by 6.6 TWh after 2008. If we include the decline in the installed capacity of the facilities of independent producers, it can be estimated that electricity production will drop by 8.1 TWh by 2010. If the measures aimed at constructing new production facilities after 2008 are carried out, it can be expected that new capacity of more than 2,500 MW and electricity production of 13 TWh will be gradually added by 2015.

ANNEX NO. 5

DEVELOPMENT OBJECTIVES TO ENSURE THE SAFETY AND RELIABILITY OF ENERGY SUPPLY

1) Electricity

a. Electricity production

The development objectives to increase the security and reliability of the operation of electricity production facilities focus on the following:

- improvement of the safety of nuclear power plants,
- reconstruction of thermal power plants so that they meet emission limits,
- reconstruction of hydropower plants with the aim of meeting the water protection aims.

b. Electricity grid

The most important priority for ensuring the safety and reliability of energy supply in the future will be the ability to deal with the impact of decommissioning of the V1 nuclear power plant in Bohunice. In this context, the future development objectives to ensure the safety and reliability of the grid can be summed up a follows:

- reconstruction of the Križovany – Medzibrod transformer stations,
- construction of new cross-border connecting transmission lines with Hungary, Poland, Ukraine and Austria in order to increase the transmission capacity of the electricity grid,
- improvement of the capacity of the current connecting lines,
- construction of new high-voltage lines (400 kV): Lemešany – Moldava, Medzibrod – Ružomberok, Gabčíkovo – Veľký Ďur,
- reconstruction of existing 400 kV high voltage lines,
- construction of new lines for the transmission of electricity as a substitute for the reduction of 220 kV lines,
- construction of a transformer station for direct transformation from 400 kV to 110 kV at the Lemešany substation,
- implementation of measures aimed at adherence to electricity supply quality by constructing compensation facilities at the Lemešany – Kapušany – Ukraine state border tertiary transformers,
- further equipment of dispatch management with the necessary information and management systems,
- completion of optical infrastructure with the aim of reinforcing the communication network necessary for transmission management,
- review of the sale of the transmission capacity of the current connecting lines.

c. Distribution network

- implementation of measures aimed at increasing the quality of electricity supply for end users,
- reconstruction of distribution and transformer stations with the aim of improving the efficiency of electricity supply to end users,
- improvement of the measurement of the electricity supplied with the aim of increasing the quality of energy supply for the end user as well as increasing the efficiency of supply,
- completion of the management and information systems necessary for the management of the distribution network,

- implementation of measures directed at reducing the costs and subsequently prices for the provision of distribution services.

2) Gas

The development objectives to improve the safety and reliability of the transfer and distribution of gas focus on the following:

- reinforcement of the international connection with Austria (Baumgarten),
- examination of the possibilities for the diversification of gas supply through the planned Nabucco gas pipeline,
- further equipment of dispatch management with the necessary information and management systems,
- implementation of measures aimed at increasing the quality of gas supply and reducing the cost of gas transmission,
- expansion of the distribution network with a view to the needs of the market and economic efficiency of investments

reconstruction and modernisation of gas facilities using state-of-the-art technological knowledge in this field.

ANNEX NO. 6

SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL IMPACTS OF THE ENERGY SECTOR

The energy sector is a heavy polluter of the environment. The issue of ensuring enough energy supply while maintaining the quality of the environment is an inevitable part of every scientific prognosis on the development of mankind. The reconciliation of the relationship between energy and the biosphere is one of today's crucial strategic tasks with respect to global environmental problems. Therefore, the development of the energy sector must abide by the principle of sustainable development.

Sustainable development means providing for the present needs of the population without restricting future generations from meeting their own needs. In order to achieve sustainable development, it is necessary to partially modify technologies, procedures and habits both on the production and consumption sides. From the point of view of sustainable development, a gradual transition from the use of non-renewable energy sources to the use of renewable energy sources will be necessary in the long run.

The total energy consumption and the structure of the energy sector in Slovakia is one of the determining factors for the degree of its impact on the environment. Therefore, it is necessary to ensure a harmonic relationship between the energy sector and the environment, above all by introducing suitable technology using mostly renewable energy sources and equipping conventional energy production technology with facilities effectively protecting the environment. All energy sources need to be used in a way that takes people's health and the environment into account.

From the standpoint of sustainable development, the implementation of the Energy Policy (EP) pursues the objective of reducing the unfavourable effects of the energy sector on the environment by means of supporting programmes allowing for a greater proportion of environmentally friendly and environmentally acceptable energy systems, in particular systems based on new and renewable sources, and by promoting more efficient and less polluting methods of transformation, transmission, distribution and use of energy, while providing even and sufficient energy supply today and in the future.

Since there is a direct proportion between the amount of energy produced and its impact on the environment, rationalisation of demand appears to be the most appropriate measure. Energy savings can be achieved in particular by:

- eliminating distortions in energy prices,
- encouraging energy saving,
- making information on energy saving accessible,
- introducing compulsory energy audits,
- introducing new consumption regulations and making existing regulations stricter,
- compulsory labelling of energy-consuming appliances.

The following are the most significant impacts of the energy sector on the environment:

1. Greenhouse gas emissions
2. Pollutant emissions
3. Wastewater
4. Waste production
5. Radioactive waste production

EP objectives mitigating the impacts of the energy sector on the environment:

1. Reduction of greenhouse gas emissions

- Reduce greenhouse gas emissions by 8% between 2008 and 2012 compared with 1990 (a Kyoto Protocol commitment).
- Create conditions for the projected second target period – ensure the reduction of greenhouse gas emissions by a further 5%.
- Get greenhouse gas emissions under control so that the growth trends are gradually mitigated and eventually stabilised after 2015.
- Elaborate a strategy in sufficient advance to reach a reduction in greenhouse gas emissions.

The Slovak Republic defined its ambitions with respect to the reduction of greenhouse gas emissions until 2020 in its "Strategy for the Fulfilment of Kyoto Protocol Commitments". In order to meet the Kyoto Protocol objectives, it is necessary to improve co-operation and develop the dialogue between the environment, energy and transport sectors, with an impact on institutional co-operation. The possibilities for international co-operation include trade in CO_2 emissions, introduction of new technology, innovation and best available techniques, greater use of nuclear energy and co-operation in the field of research and development.

The reduction of greenhouse gas emissions in the energy sector will be encouraged by:

- greater energy efficiency of electricity production and promotion of more effective conversion technologies and higher grade fuels,
- greater proportion of energy from renewable sources and highly efficient co-generation of heat and electricity.

The Slovak Republic – a signatory of the Kyoto Protocol – is currently around 25% below the greenhouse gas emissions limit. Thanks to its proportion of electricity produced from nuclear sources, Slovakia is today among countries with a very low level of CO_2 emissions in proportion to the amount of electricity produced. CO_2 emissions reached the level of 203 kg/MWh in 2003.

In order to reduce emissions, it is also necessary to meet the objectives set out in EU documents, which define the following priorities:

- alignment of areas leading to economic efficiency, energy efficiency of the products used, the use of energy sources with a favourable impact on the environment and the use of renewable energy sources so as to ensure a balance between energy supply and demand,
- economic development in the confines of natural conditions and potential,
- rational use of natural resources,
- support for the development of combined transport.

2. Reduction of pollutant emissions

- Increase the proportion of fuels with a lower content of pollutants per energy unit (fuel substitution).
- Adopt suitable measures to reduce pollutant emissions, in particular sulphur, carbon and nitrogen oxides, as well as solid pollutants.

Basic pollutants and specific pollutants include particulate matter (PM), sulphur oxides expressed as sulphur dioxide (SO_2), nitrogen oxides (NO_x) expressed as nitrogen

dioxide, carbon monoxide (CO), volatile substances, organic substances (e.g. NMVOC) expressed as total organic carbon in waste gases in gaseous phase and dibenzodioxins and dibenzofurans.

Within the framework of air protection, it is necessary to continue to make the energy production base more environmentally friendly with the aim of reducing the production of pollutants discharged into the atmosphere. The basic pollutants discharged into the atmosphere in electricity and heat production from fossil fuels include particulate matter (PM), sulphur oxides (SO_2), nitrogen oxides (NO_x) and carbon monoxide (CO). In recent years, the emissions of sulphur and nitrogen oxides and solid pollutants substantially declined as a result of a drop in the consumption of solid fuels, such as black and brown coal and heavy fuel oils. The air protection legislation in force in the Slovak Republic specifies emission limits for these substances – i.e. the maximum permissible concentration values of harmful substances that must be adhered to by facilities burning fossil fuels. These values are fully harmonised with the emission limits accepted in European Union legislation.

In the medium and long run, there has been a continuous positive trend in Slovakia towards the gradual reduction of harmful substances discharged into the atmosphere. This decline is a result of the gradual reduction of the proportion of electricity and heat production in power plants burning fossil fuels, while extending the use of reconstructed facilities with progressive fluid technologies and reliable operation of technologies cleaning the products of combustion. A quality indicator of the situation in the production of pollutants are the trends in emissions of the 110 MW units (12 units in the Vojany power plant and 4 units in the Nováky power plant) per unit of electricity produced from fossil fuels.

3. Adherence to wastewater pollution limits and disposal of substances endangering the quality of surface water, groundwater and soil

Wastewater discharged from power plants is predominantly coolant water and water carrying ash to settling ponds. It is produced by both thermal and nuclear power plants.

4. Reduction of the amount of waste, restriction of waste generation and promotion of recycling over disposal

From the standpoint of the types of waste, the greatest amount of waste produced by the dominant electricity producer SE, a.s., originates from the burning of coal in thermal power plants. Ash materials generated from the burning of coal (ash, slag, bottom ash, fly ash) and stabilised FGD materials make up around 97% of all waste produced by SE, a.s. As a result of declining production of electricity from coal, the amount of this waste is gradually decreasing. SE, a.s., produces almost 1.4 million tons of waste of all categories annually. By individual categories, dangerous waste makes up 0.1% and other waste 99.9% of the total amount of waste. The share of thermal power plants of SE, a.s., in the total amount of waste produced is 98%, the share of waste from nuclear power plants is 1.89% and the share of waste from hydropower plants is 0.11%.

The gas sector produces more than 11 thousand tons of waste annually. It deals with more than 50 types of waste generated in operational activities (such as repair and maintenance of gas lines, repair and maintenance of installations and technological facilities,

disposal of technological facilities, cleaning of the transit system, etc.), as well as in service and support activities (transport, administration, cleaning of waterworks, etc.).

The heavy use and consumption of large amounts of oil products is typical for the gas sector in general. The amount of waste used and the amount of oil waste generated depends on investment and reconstruction activities and disposal of installations and technological facilities, cleaning of the transit system, cleaning of waterworks, etc.

5. Preparation and adherence to the steps and timetable for the disposal of spent nuclear fuel and the procedure for the disposal of nuclear electricity production facilities

Spent nuclear fuel can be defined as nuclear fuel that has been permanently withdrawn from a nuclear reactor following irradiation in its active zone. The foundations of the concept for the disposal of spent nuclear fuel and radioactive waste (RAW) were laid down in Governmental Resolutions No. 930/1992, 190/1994 and 5/2001.

Liquid RAW consists of concentrates, sludge, sorbents and oils, with concentrates being the major component. The figures on the overall generation of concentrates in the V-1 and V-2 units of the Bohunice nuclear power plant and in the Mochovce nuclear power plant show a decrease in the generation and an increase in the processing of these concentrates. The systematic approach to the issue of RAW disposal is reflected in the decline in the production of solid and liquid waste seen in recent years. Increased generation of RAW in 1997 and 1998 related to the reconstruction work at individual nuclear facilities.

Solid RAW includes filters, metallic RAW, concrete debris, and combustible and compactable RAW. At the power plant, liquid RAW is provisionally sorted at the site of generation depending on its subsequent processing and handling. Precise aggregate data on the generation of RAW with respect to its storage is not available since some combustible waste is continuously burnt and is not included in waste inventory records and certain types of waste is monitored by the operator in pieces or tons, depending on the method of storage. The disposal of RAW consists of compaction of liquid RAW by bituminisation and cementation and subsequent storage of solid and liquid RAW.

Sustainable development in the satisfaction of energy needs of the population in Slovakia, typified by the fact that more than 50% of electricity is produced in nuclear power plants, requires permanent support for measures aimed at maintaining safety in the use of nuclear energy for energy production purposes, as well as measures comprehensively dealing with the whole lifecycle of these facilities. This means adequate investment in the disposal of nuclear facilities and the disposal of the spent nuclear fuel generated, so as to avoid unfavourable impacts on the environment. The implementation of the energy policy objectives in the area of continuous safeguarding of nuclear safety and operational reliability of nuclear power plants means the use of nuclear energy in Slovakia on the basis of a long-term concept covering all phases of the lifecycle of nuclear energy facilities.

The operation of nuclear energy facilities in compliance with the European Union policy requires regulation in the area of nuclear safety ensured by an independent and professionally competent regulatory authority. The capacity of the regulatory authority should be sufficient to create a comprehensive regulatory framework for the safe use of nuclear energy.

Certain measures to meet the above objectives:

- maintain and improve environmental behaviour of energy market participants and increase environmental awareness of all stakeholders,
- thoroughly observe and actively apply the environmental legislation in force,
- direct the development of the energy sector towards technologies reducing negative environmental impacts,
- perform activities allowing for the economical use of energy and raw materials and promoting the use of renewable energy sources,
- implement systematic accident prevention and update emergency readiness procedures,
- monitor and evaluate environmental impact indicators,
- provide information about environmental impacts,

maintain open dialogue with the public in the area of environmental protection.

ANNEX NO. 7

MEASURES AIMED AT INCREASING ENERGY EFFICIENCY

General measures aimed at increasing energy efficiency:

1. Elaborate an energy efficiency concept as a basic conceptual document.
2. Elaborate a set of legislative and institutional measures that will create an environment allowing for the implementation of measures aimed at improving energy efficiency in individual sectors of the economy.
3. Ensure co-ordination of activities concentrated on the implementation of activities to improve the energy efficiency at central, regional and local administration.
4. Propose support programmes containing priorities and measures directed towards the promotion of energy efficiency.
5. Elaborate regional energy concepts aimed at energy efficiency and ensure monitoring of progress.
6. Prepare and information campaign aimed at increasing consumer awareness of energy efficiency, including energy consumption and costs, accessibility and reliability of energy-effective technologies, advantages arising from savings, the possibilities of financing energy efficiency measures, etc.,
7. Promote the introduction of new consumption standards.

MEASURES AIMED AT INCREASING ENERGY EFFICIENCY OF PRODUCTION, TRANSMISSION AND DISTRIBUTION

On the production side, the measures will focus on the reduction of energy consumption by increasing energy efficiency of individual energy production facilities and optimisation of the production of heat and electricity, or other forms of energy.

The following are the specific measures to increase energy efficiency:

1. Improvement of the efficiency of thermal power plants by reconstructing existing production facilities with the aim of achieving a reduction in the consumption of primary fuels, cost of electricity and heat production, unfavourable environmental impacts and broader scope of support services and operational flexibility in order to:
   - reduce own consumption of existing thermal power plants by replacing outdated installations with more modern facilities with better performance and lower energy intensity,
   - exchange morally and physically obsolete production facilities for new facilities with more progressive technical parameters,
   - reduce the consumption of fuel necessary for the start-up and stabilisation of production using plasma burners,
   - recover waste heat in steam or hot water,
   - reduce losses in heat distribution systems,
   - optimise heat supply.
2. Improvement of the economy of the fuel cycle with a focus on better use of nuclear fuel using new modified systems for the monitoring and intrareactor control of operational parameters of nuclear fuel and the active zone. More effective use of nuclear fuel can be achieved by using profiled fuel with burn-up absorbers, increasing the original fuel enrichment, the medium value of burn-up and the residence time of the fuel in the reactor. Another possibility is to extend fuel campaigns.

3. Enhancement of the capacity of nuclear power plants by making use of the existing conservative capacity reserves and implementing programmes for the modernisation of NPP and innovation of technological facilities with the possibility of installing new turbines with higher capacity and efficiency.
4. Improvement of operational reliability and safety through the preparation and implementation of programmes for controlled aging of nuclear energy facilities with the aim of knowing the changes in the condition of these facilities, monitoring and evaluating their lifespan and, on the basis of the data acquired, optimising the scope of maintenance, repair and non-destructive control. The application of diagnostic systems and early diagnostics of the condition of the facilities prevents possible breakdowns and unplanned shutdowns, allows for shortening the period of shutdowns of units undergoing planned maintenance during fuel exchange and reduces the frequency of failures, which result in greater efficiency and effectiveness of the production facility.
5. Greater use of the hydro-energy potential through reconstructions directed at increasing energy conversion efficiency or implementing rationalisation measures. Another possibility is to increase the gross head of the power plant by raising the water level in the reservoir and excavating the bed of the outflow stage.
6. Reduction of the losses in transmission and distribution with a focus on the transmission and distribution of electricity, gas and heat. Minimise losses in the transmission and distribution of energy from the producer to the end user by optimising operation and management and introducing new technologies.

Measures aimed at the consumption side

The energy consumption side focuses on industry, households, the third sector, and the transport and energy sectors, which provides extensive opportunities for guidance towards achieving energy consumption savings.

1. Reduce the high energy intensity of the generation of gross domestic product in the industry
   - promote the application of technologies and processes that use the energy spent for the generation of added value to the maximum extent.
2. Achieve maximum utilisation of the potential of heat savings in the business, state and municipal spheres, as well as in households.

As a matter of priority, focus on heat savings projects with low investment cost and maximum benefits – reconstruction and insulation of heat distribution systems. In the case of buildings, achieve this by implementing harmonised technical standards based on energy certification of buildings, definition of thermal technical requirements for new and reconstructed buildings, and regular inspections of boilers, heating facilities and air-conditioning in buildings.

In the case of households, where electricity consumption has an increasing tendency mainly due to increasing personal comfort by equipping households with new appliances, increase the population's awareness of the need to prefer and use energy efficient appliances.

A programme defining energy standards for office equipment (the Energy Star programme) and lighting will need to be elaborated for the third sector.

The energy efficiency of transport will need to be increased with a view to the growth of car traffic, which significantly affects the energy intensity of the economy. Due to the limited scope of water and air transport, the road to energy savings leads through the promotion of rail over road transport and public over individual transport. The importance of water transport will increase in connection with the expected swift rise in crude oil prices and the importance of air transport will increase in the context of the development of the economy, the single air transport market and foreign investment.

In the energy sector, it is proposed that energy efficiency be increased by means of modernisation, introduction of new technology and optimisation of processes with improved safety, reliability, productivity and quality of products. In the case of electricity and heat production, co-generation offers an energy efficient alternative where the need to supply heat exists.

ANNEX NO. 8

RESEARCH AND DEVELOPMENT IN THE ENERGY SECTOR

Research and development in the energy sector is the subject of priority interest in every economic system. Research and development in the energy sector in Slovakia, which lacked support for many years, does not reach the required scope that would be comparable with economically advanced countries of the world. This situation led to disintegration and radical reduction of the research capacity and dispersion of highly qualified personnel. The key problem of today's research and development in the Slovak energy sector is the low level of funding. Research and development focused mainly on nuclear, coal, gas and hydro energy sources. The research and development in the area of renewable energy sources was insufficient. Nevertheless, the draft of priority research and development tasks until 2015 builds upon the objective to ensure appropriate development of the use of renewable energy sources. With a view to the various forms of these sources, this is an extraordinarily difficult task and it is hard to image comprehensive and successful implementation of this task without support in this area. No research units have been created to deal specifically with the issue of the development of the energy industry as a sector of the economy (a separate institution or an institution at the Slovak Academy of Sciences (SAS), e.g. the SAS Energy Institute). Certain issues are being dealt with by the nuclear energy research institute VÚJE, a.s., Trnava, VUPEX, a.s., Bratislava, EGÚ, s.r.o., Bratislava, EVPÚ, a.s., Nová Dubnica, VÚEZ, a.s., Levice, as well as by technical universities co-operating with research establishments in the field of energy, e.g. the Faculty of Electrical Engineering of the Slovak Technical University in Bratislava, Faculty of Electrical Engineering of the Technical University in Košice and the Žilina University.

The global strategic objective and content of research and development in the energy sector in Slovakia was determined by science and technology development tasks until 2002, which were implemented by research and development organisation dealing with the energy sector. Since 2002, in accordance with Act No. 132/2002 on Science and Technology as amended, research and development activities financed from the state budget are carried out by means of "State Research and Development Programmes" and "State Research and Development Orders". A cross-sectional state research and development programme was created for the energy sector called "Application of Progressive Energy Production and Conversion Principles" for the 2002-2005 period, with an outlook to 2010.

One of the visible trends in today's science and technology development in the world is the intensification of international co-operation. Slovakia is dependent on such co-operation, but, at the same time, it has to take its realistic capacity for this participation into account. It is therefore likely that emphasis will be placed on co-operation within the European Research Area. The EU Treaty provides the EU with the legal framework for measures aimed at promoting European co-operation in research and technical development. The key instrument for international co-operation in science and technology in Europe are EU Framework Programmes for research and technical development. Co-operation with other partners (mainly the US and Japan) will be limited to the opportunities offered by individual partners and Slovakia's commitments towards international organisations. The priorities are focused on applied rather than basic research. Research and development will be directed at such areas of the energy sector where the results are applicable in Slovak conditions and bring benefits for the whole society. The result should be the introduction of technologies competitive with state-of-the-art technologies from abroad.

Research and development priorities in the energy sector:

1. New and advanced technologies:

a) New technologies for energy conversion, transmission and accumulation
(hydrogen economy, improved power lines, transmission capacity of electrical lines at voltage levels of the transit and distribution system, fuel cells, heat pumps, centralised heat supply systems, energy accumulation systems, superconductive toroids, superconductive energy transmission, cold fusion, advanced heat accumulation, quality systems and standards in the energy sector),

b) Systemic and regional energy sectors
(analysis of the strategic advantages in hierarchical structures of the energy sector, modelling of co-operation between the systemic and regional energy sectors, efficiency and the environmental and social aspects of operation, development and harmonisation of the systemic and regional energy sectors, operation of power plants with renewable and alternative sources at the regional level, the use of municipal waste for energy purposes, analysis of the development and synergetic effects of energy systems in independent hierarchical structures).

c) Technologies for the decommissioning of nuclear facilities and storage of spent nuclear fuel (technologies for the economical and safe decommissioning of nuclear facilities, technologies for the disposal of the products of the rear fuel cycle of nuclear power plants, technologies for the storage of radioactive waste that cannot be stored in the national radioactive waste storage site in Mochovce).

2. Sustainable development

a) Microregional systems for renewable energy sources
(the specific aspects of technologies for the use of biomass, solar, wind and geothermal energy, small hydropower plants and the energy of ambient temperature difference, systemic use of technologies using renewable energy sources, management of the microregional energy system),

b) More economical and environmentally friendly energy sector
(symbiosis between large and small energy production facilities, analysis of investment alternatives in the systemic and regional energy sectors, economical development and operation of energy systems and limitation of their negative impacts on the environment, competition between energy systems and their elements, disposal of energy sector waste, consumer services of the energy sector, economical use of primary and secondary energy sources, lower grade fuels, waste heat, new methods for analysis of consumption of individual forms of energy, economic and environmental quality management systems, optimisation of the system of trade in energy, modelling of the elements of a liberalised energy market, capture and geological storage of CO_2 from power plants using fossil fuels),

c) Demand side management (DSM) and rationalisation of energy consumption
(rational energy consumption systems, rational energy consumption programmes, economic and environmental effects and reduction of the energy production and transmission through more reasonable consumption, greater efficiency, environmentally and socially rational

electricity consumption, new methods for analysis of electricity consumption, systemic management of electricity consumption).

3. Innovation, new methods of research, development and education

a) Reliability and safety of the electricity grid
(prevention of major accidents and large-scale social and environmental damage, reliability and safety analysis of energy systems and their elements, systemic and technical measures to ensure the reliable and safe operation of energy systems, reliability and safety of the regulator in a liberalised environment, new methods of modelling reliability and safety of energy sources and transmission and distribution routes, optimisation of reliable and safe organisational structures, education and training on simulators of stations, substations and networks),

b) Knowledge economy
(a system of science, philosophy and awareness in the energy sector, creativity and development research, knowledge systems, expert and training systems, knowledge models for sustainable development of the energy sector, new methods of design and operation of information systems).

c) Nuclear safety and reliability of nuclear energy facilities
(prevention of nuclear accidents and large-scale damage, systemic support for the regulator in the field of nuclear safety, development of methods for the assessment of ageing of important components of nuclear facilities, safety of nuclear energy facilities when increasing their capacity).

ANNEX NO. 9

Overview of the legislation in force

The field of energy is regulated by a number of legal regulations of the EU, the most important of which are the following:

- Directive 93/76/EEC of 13.09.1993 focusing on the limitation of carbon dioxide emissions by improving energy efficiency (SAVE),
- Directive 2001/77/EC of 27.10.2001 on the promotion of electricity produced from renewable energy sources,
- Directive 2002/91/EC of 16.12.2002 on the energy performance of buildings,
- Directive 2003/30/EC of 08.05.2003 on the promotion of the use of biofuels or other renewable fuels for transport,
- Directive 2003/54/EC of 26.06.2003 concerning common rules for the internal market in electricity,
- Directive 2003/55/EC of 26.06.2003 concerning common rules for the internal market in natural gas,
- Directive 2003/96/EC of 27.10.2003 restructuring the Community framework for the taxation of energy products and electricity,
- Directive 2004/8/EC of 11.02.2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market,
- Directive 2004/67/EC of 26.04.2004 concerning measures to safeguard security of natural gas supply,
- EP and Council Regulation (EC) No 1407/2002 on State aid to the coal industry,
- EP and Council Regulation (EC) No 1228/2003 of 26.06.2003 on conditions for access to the network for cross-border exchanges in electricity.

The energy area is regulated above all by the following legal regulations in Slovakia:

- Act No. 656/2004 Coll. on Energy and on Amendment of Certain Laws,
- Act No. 657/2004 Coll. on Heat Energy,
- Act No. 276/2001 Coll. on Regulation in Network Industries and on Amendment and Supplementation of Certain Laws as amended,
- Governmental Ordinance No. 123/2005 Coll. laying down the rules for the operation of the gas market
- Governmental Ordinance No. 124/2005 Coll. laying down the rules for the operation of the electricity market
- Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy,
- Act No. 254/1994 Coll. on the State Fund for the Decommissioning of Nuclear Energy Facilities and Disposal of Spent Nuclear Fuel and Radioactive Waste
- Act No. 82/1994 Coll. on State Material Reserves,
- Act No. 170/2001 Coll. on Emergency Reserves of Crude Oil and Petroleum Products and on Addressing Situations of Oil Crises,
- Act No. 51/1988 Coll. on Mining Activities, Explosives and State Mining Administration as amended and on Amendment and Supplementation of Certain Laws,
- Act No. 44/1988 Coll. on the Protection and Use of Mineral Resources (the Mining Act),
- Act No. 127/1994 Coll. on Environmental Impact Assessment as amended,
- Act No. 71/1967 Coll. on Administrative Proceedings (the Code of Administrative Procedure) as amended.
- Act No. 272/1994 Coll. on the Protection of People's Health and on Amendment and Supplementation of Certain Laws,

- Act No. 478/2002 Coll. on Air Protection and on Supplementation of Act No. 401/1998 Coll. on Air Pollution Charges as amended (Air Act),
- Act No. 401/1998 Coll. on Air Pollution Charges,
- Act No. 184/2002 Coll. on Waters and on Amendment and Supplementation of Certain Laws (Waters Act),
- Act No. 50/1976 Coll. on Territorial Planning and the Construction Code as amended (the Construction Code),
- Act No. 572/2004 Coll. on Emission Allowance Trading and on Amendment and Supplementation of Certain Other Laws,
- Governmental Ordinance No. 236/2005 Coll. of 18.05.2005 concerning the performance of heat sources used for heating and preparation of hot service water in non-industrial buildings,
- Governmental Ordinance concerning the minimum technical efficiency of energy-consuming appliances,
- Governmental Ordinance concerning energy labelling of selected household appliances.

All legal regulations of the EU currently in force have been implemented into Slovak legal regulations covering the area of energy. The legal regulations will be amended in order to use experience from their application or due to the adoption of new legal regulations at the EU level.

RESOLUTION OF THE GOVERNMENT OF THE SLOVAK REPUBLIC

No. 29

from 11 January 2006

concerning the Draft Energy Policy of the Slovak Republic

Document No: 22259/2005
Submitted by: Deputy Prime Minister and Minister for Economy

The Government

adopts

Draft Energy Policy of the Slovak Republic;

notes

Annexes No. 1 to 9 of the Draft Energy Policy of the Slovak Republic;

tasks

Deputy Prime Minister and Minister for Economy

Minister for Soil Management

Minister for Environment

with developing the strategy for higher use of renewable energy sources in the Slovak Republic.

by 30 June 2006

Deputy Prime Minister and Minister for Economy

with elaborating analysis of possibilities of diversification of sources and transport routes for oil and natural gas

by 30 June 2007

with developing an Energy Effectiveness Concept and submitting it to the Government session

by 31 December 2006

recommends

Deputy Prime Minister and Minister for Economy

to implement the Energy Policy of the Slovak Republic while executing state administration in power industry

continuously

to create prerequisites for construction of transmission trunks connecting plants of the

neighbouring states

continuously

to the Chairperson of the Distribution Network Industry Branches Regulation

to reflect the Energy Policy of the Slovak Republic in the regulatory policy

continuously

to Heads of Regional Authorities

to break down the Energy Policy of the Slovak Republic into regional energy policies

by 30 June 2007

To be implemented by: Deputy Prime Minister and Minister for Economy
Minister for Soil Management
Minister for Environment

For information of: Chairperson of the Distribution Network Industry Branches Regulation
Heads of Regional Authorities